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HST Image Restoration: A Comparison of Pre- and Post-Servicing Mission Results

P-1
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A variety of image restoration techniques (e.g., Wiener filter, Lucy-Richardson, MEM) have been applied quite successfully to the aberrated HST images. The HST servicing mission (scheduled for late 1993 or early 1994) will install a corrective optics system (COSTAR) for the Faint Object Camera and spectrographs and replace the Wide Field/Planetary Camera with a second generation instrument (WF/PC-II) having its own corrective elements. The image quality is expected to be improved substantially with these new instruments. What then is the role of image restoration for the HST in the long term?

Through a series of numerical experiments using model point-spread functions for both aberrated and unaberrated optics, we find that substantial improvements in image resolution can be obtained for post-servicing mission data using the same or similar algorithms as being employed now to correct aberrated images. Included in our investigations are studies of the photometric integrity of the restoration algorithms and explicit models for HST pointing errors (spacecraft jitter).